What Is Claimed Is:

1. A wireless modem apparatus, comprising:

a balanced transmitter for up-converting a baseband signal, including,

an inverter, to receive said baseband signal and generate an inverted baseband signal;

a first controlled switch, coupled to a non-inverting output of said inverter, said first controlled switch to sample said baseband signal according to a first control signal, resulting in a first ~~harmonically~~ rich signal;

a second controlled switch, coupled to an inverting output of said inverter, said second controlled switch to sample said inverted baseband signal according to a second control signal, resulting in a second harmonically rich signal; and

a combiner, coupled to an output of said first controlled switch and an output of said second controlled switch, said combiner to combine said first harmonically rich signal and said second harmonically rich signal, resulting in a third harmonically rich signal.

2. The apparatus of claim 1, wherein said second control signal is phase shifted with respect to said first control signal.

3. The apparatus of claim 1, wherein said second control signal is phase shifted by 180 degrees with respect to said first control signal.

4. The apparatus of claim 1, wherein said first control signal and said second control signal each ~~comprise~~ a plurality of pulses having an associated pulse width T_A that operates to improve energy transfer to a desired harmonic image in said harmonically rich signal.

5. The apparatus of claim 4, wherein said pulse width T_A is approximately ½ of a period of said desired harmonic.

6. The apparatus of claim 1, further comprising a filter attached to an output of said combiner, wherein said filter selects a desired harmonic from said third harmonically rich signal.

7. The apparatus of claim 1, further comprising:

a balanced receiver, coupled to said balanced modulator, said receiver including,

a first universal frequency down-conversion module to down-convert an input signal, wherein said first universal frequency down-conversion module down-converts said input signal according to a third control signal and outputs a first down-converted signal;

a second universal frequency down-conversion module to down-convert said input signal, wherein said second universal frequency down-conversion module down-converts said input signal according to a fourth control signal and outputs a second down-converted signal; and

a subtractor module that subtracts said second down-converted signal from said first down-converted signal and outputs a down-converted signal.

8. The apparatus of claim 7, wherein said fourth control signal is delayed relative to said third control signal by .5 + n cycles of said input signal, wherein n may be any integer greater than or equal to 1.

9. The apparatus of claim 7, wherein said first universal frequency down-conversion module under-samples said input signal according to said third control signal, and said second universal frequency down-conversion module under-samples said input signal according to said fourth control signal.

10. The apparatus of claim 7, wherein said third and said fourth control signals each comprise a train of pulses having pulse widths that are established to improve energy transfer from said input signal to said first and said second down-converted signals, respectively.

11. The apparatus of claim 10, wherein said train of pulses have a pulse width that is approximately a fraction of a period of said input signal.

12. The apparatus of claim 10, wherein said train of pulses have pulse width that is approximately multiple periods and a fraction of a period of said input signal.

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13. The apparatus of claim 10, wherein said first and said second universal frequency down-conversion modules each comprise a switch and a storage element.

14. The apparatus of claim 13, wherein said storage element comprises a capacitor that reduces a DC offset voltage ~~in said~~ first down-converted signal and said second down-converted signal.

15. The apparatus of claim 7, wherein said subtractor module comprises a differential amplifier.

16. The apparatus of claim 7, further comprising an antenna coupled to said balanced transmitter and said balanced receiver.

17. The apparatus of claim 16, further comprising a switch, said switch connecting either said transmitter or said receiver to said antenna.

18. The apparatus of claim 7, further comprising a baseband processor coupled to said transmitter and said receiver.

19. The apparatus of claim 7, further comprising a media access controller (MAC) coupled to said transmitter and said receiver.

20. The apparatus of claim 19, wherein said MAC comprises a means for controlling accessing to a WLAN medium.

21. The apparatus of claim 20, wherein said means for controlling includes carrier sense multiple access with collision avoidance (CSMA/CA).

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22. The apparatus of claim 7, further comprising a demodulator/modulator facilitation module coupled to said transmitter and receiver.

23. The apparatus of claim 22, wherein said demodulator/modulator facilitation module comprises a means for modulating said baseband signal using differential binary phase shift keying (DBPSK).

24. The apparatus of claim 22, wherein said demodulator/modulator facilitation module comprises a means for de-modulating said down-converted signal using differential binary phase shift keying (DBPSK).

25. The apparatus of claim 22, wherein said demodulator/modulator facilitation module comprises a means for spreading said baseband signal.

26. The apparatus of claim 25, wherein said means for spreading comprises a means for spreading said baseband signal using a Barker code.

27. The apparatus of claim 22, wherein said demodulator/modulator facilitation module comprises a means for de-spreading said down-converted signal.

28. The apparatus of claim 27, wherein said means for de-spreading comprises a means for de-spreading said down-converted signal using a Barker code.

29. The apparatus of claim 1, wherein said apparatus is an infrastructure device.

30. The apparatus of claim 1, wherein said apparatus is a client device.

31. The apparatus of claim 1, wherein said first controlled switch shunts said baseband signal to a reference potential according to said first control signal, and wherein said second controlled switch shunts said inverted baseband signal to said reference potential according to said second control signal.

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~~32~~. A method of transmitting a baseband signal over a wireless LAN, comprising the steps of:

(1) spreading the baseband signal using a spreading code, resulting in a spread baseband signal; and

(2) differentially sampling the spread baseband signal according to a first control signal and a second control signal resulting in a plurality of harmonic images that are each representative of the baseband signal, wherein said first and second control signals have pulse widths that improve energy transfer to a desired harmonic image of said plurality of harmonics.

33. The method of claim 32, further comprising the step of:

(3) modulating the baseband signal using phase shift keying prior to step (1).

34. The method of claim 32, further comprising the steps of:

(3) determining availability of a WLAN medium; and

(4) transmitting said desired harmonic over said WLAN medium if said medium is available.

35. The method of claim 34, wherein step (3) comprises the step of determining availability of said WLAN medium using carrier sense multiple access (CSMA) protocol.

36. The method of claim 32, wherein said step (2) comprises the step of:

(a) converting said baseband signal into a differential baseband signal having a first differential baseband component and a second differential baseband component;

(b) sampling said first differential component according to said first control signal to generate a first harmonically rich signal, and sampling said second differential component according to said second control signal to generate a second harmonically rich signal, wherein said second control signal is phase shifted relative to said first control signal; and

(c) combining said first harmonically rich signal and said second harmonically rich signal to generate said harmonic images.

37. The method of claim 32, further comprising the step of:

(3) minimizing DC offset voltages between sampling modules during step (2), and thereby minimizing carrier insertion in said harmonic images.

38. The method of claim 32, wherein said pulse widths are approximately ½ of a period of said desired harmonic.

39. In a wireless LAN device, a method of down-converting a received RF signal, comprising the steps of:

down-converting said received RF signal according to a first control signal and a second control signal, resulting in a down-converted signal, wherein said second control signal is delayed relative to said first control signal by .5 + n cycles of said received RF signal, wherein n may be any integer greater than or equal to 1;

de-spreading said down-converted signal using a spreading code, resulting in a de-spread signal; and

de-modulating said de-spread signal, resulting in a de-modulated signal;

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wherein said ~~first~~ and said second control signals each comprise a train of pulses having pulse widths that are established to improve energy transfer from said received RF signal to said down-converted signal.

40. The method of claim 39, wherein said pulse widths are approximately ½ of a period of said received RF signal.

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